

Renewable Energy and Environmentally Sustainable Design Case Studies

Northcote – Solar Hot Water

Award Winning Project:

This project won the 2012 Clean Energy Council award for *Best Design and Installation of a Solar Hot Water System*.

“We were always keen to have solar hot water as part of our renovation but our house offers very limited north facing roof space so we were not sure it would be possible. But Mark at Going Solar did not give up and came up with a solution and worked closely with us and our architect to accommodate the panels into the design. Mark then worked collaboratively with us, our builder, plumber and cabinet maker during the fitting of the system, and the supporting water circulation pump. All the steps required discussion, collaboration and some flexibility but the ideas from Mark at Going Solar helped make the system a reality for us.”

Jo and Justin, 6/06/12

Site:

Northcote, Melbourne, Victoria

Dates:

- System Design: March 2011
- System Installation: April 2012
- System Commissioned: April 2012

Client:

Private Client

Project Goals:

On viewing the site plans for this project it became obvious that suitable roof places for solar were limited, with the original house having east and west facing spaces. So the goal was to design and install a solar hot water and take advantage of the possibilities.

Project Features:

The system consists of:

- 1 x Rinnai Prestige 330L stainless steel storage tank
- 2 x Rinnai Excelsior FTC Premium Copper Solar Collector Panels
- 1 x Rinnai Solar Infinity 26 External Natural Gas Booster
- 1 x On Demand Circulation Pump

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SHW Panels on Roof



Solar Panels, Storage Tanks And Gas Booster



Detail of Storage Tank



Circulation Pump

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Case Studies

One of the common difficulties faced by a solar hot water system in a location like Melbourne is achieving a minimal boosting requirement in the cooler months, which, in urban locations like Northcote, is usually provided by a conventional method using either natural gas or electricity.

For Melbourne, inclining solar collectors at up to 60 degrees from the horizontal achieves significantly better year-round performance than “standard” angles of between 10 and 30 degrees by increasing the effective aperture area of the collector in the cooler months – ie by better facing the sun. In a thermosyphoning (close coupled) system, it has the secondary benefit of increasing efficiency by reducing the resistance that the water heated in the collectors encounters when wanting to rise freely into the storage tank. A tertiary benefit is that in the middle of summer when too much solar heating can be an issue, the 60 degree collector angle reduces the effective aperture area during this time - when compared to collectors at 10-30 degrees that virtually face the midday sun in summer. Plenty of 100% solar heated water is still expected.

Inclining SHW collectors at 60 degrees to the horizontal is rarely practical on either new or existing houses, unless specifically part of the design to avoid wind loading and visual aesthetic issues.

We discussed with the client and her architect the concept of installing two flat plate Rinnai Excelsior SHW panels at approximately 60 degrees to the horizontal, leaning against a small section of wall directly outside a new upstairs (2nd) bathroom, thermosyphoning into a Rinnai Prestige 330L stainless steel storage tank on a small flat section of roof above, with a Rinnai Solar Infinity 26 instantaneous gas booster installed at the side of the panels. They were happy to proceed after checking town planning etc. The end result looks quite designed – the SHW panel angle picks up a nearby small section of roof on a similar angle.

This configuration:

- Maximises the remaining 10 degree north-facing roof space for future PV panels.
- Achieves an optimal-efficiency close-coupled solar hot water system.

The clients were also keen to avoid the inefficiency of a long wait for hot water to arrive in the kitchen and main bathroom, which are both located near the southern end of the original part of the house some 20 metres in plumbing pipe distance away from the solar hot water system.

An on-demand hot water pre-circulation pump was installed at the back of a kitchen drawer, which, on activation by a radio transmitter button in a convenient location, pumps water from the hot water system, pushing the cold water in the lines back to the cold water inlet of the hot water tank. When the hot water reaches the pump, it shuts off automatically. The user, after waiting a set time (approx. 2 min in this case) can then open a hot water tap and quickly receive hot water.

Compared to just running the water down the drain, if this pump was used 3 times a day, approx. 3.5 kWh per year of pumping energy (electricity) would be used to save approx. 20,000L of water.

Project Team:

- Mark Donaldson, System Designer, Going Solar
- Darren Bride, Plumber

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